CLINICAL SAFETY & EFFECTIVENESS

COHORT # 9

The Impact of a Procedure Service on Patients Presenting with Pleural Effusions

CENTER FOR PATIENT SAFETY & HEALTH POLICY

UT Health Science Center

SAN ANTONIO

Educating for Quality Improvement & Patient Safety
Financial Disclosure

David R. Schmit, MD has no relevant financial relationships with commercial interests to disclose.
The Team

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- **Team Leader and CSE Participant**
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Prior to July 2012, Internal Medicine residents were taught bedside procedures with simulation based training.

Follow-up training/“expertise” was dependent on patient encounters and supervision from various faculty members or upper level residents.

This method introduced variability in techniques.

Emerging data shows improved success rates and lower complication rates with ultrasound guided procedures.

Procedure Service/Patient Safety (PS²) created in July 2011.
Background – Procedure service

- VA provided funding for a chief resident to promote training in Patient Safety and Quality Improvement
- PS2 was created to provide a standardized curriculum of bedside procedures while incorporating ultrasound training and patient safety
- Through this course and internal QI projects, we are studying the impact of the procedure team

Curriculum consists of:
- Ultrasound trained chief resident serving as faculty
- Didactic lectures
- Simulation training
- Ultrasound training
- Procedure videos
- QI lectures/projects
- Check lists, pre-testing/post-testing
PS²: Impact so far

- PS² has decreased time to paracentesis at the VAH 14→11h
- 342 procedures performed
- 112 procedures not performed because of safety issues or not enough fluid to remove

We wanted to look at the impact of the PS² service on thoracentesis success and complication rates at UH/VAH
Definition: Removal of fluid from the pleural space usually with the insertion of a needle with or without ultrasound assistance.

Common bedside procedure - estimated 200,000 thoracentesis each year.

Last year, Internal Medicine performed 219 thoracentesis.

Used to evaluate a pleural effusion of unknown etiology or provide therapeutic relief.

Complications include: pneumothorax, pain, infection, local/SQ bleeding, hematoma, injury to neurovascular bundle.
Background - Thoracentesis
Pneumothorax

Pneumothoraces can result in:
- Prolonged hospital course/cost
- Need for chest tube
- Shortness of breath/Chest pain
- Cardiac arrest/death
- Increase morbidity/mortality
**Steps to Thoracentesis**

**Pre-Admission – ER/Clinic**
- Patient presents with sob, chest pain
- Assessed by ED (incl. CXR, ordering, drawing, waiting for labs)
  - YES: Patient has Pleural effusion
    - Notify Triagist
    - No PLEURAL EFFUSION: Exit algorithm
  - NO PLEURAL EFFUSION: Exit algorithm
- Labs done?
  - NO: Wait for labs
  - YES: Perform tap in ED

**Post-Admission – Medicine Service**
- Resident writes admit order
- Bedflow finds bed for patient
- Bedflow notifies triage staff of bed
- Triage calls transport
- Pt transported to the ward
- Supplies collected
- Obtain working “COW”
- Obtain consent
- Order diagnostic studies
- Do procedure
- Label, bag specimens, place in box
- Nurse calls transport
- Post Procedure CXR
- transport takes specimen to lab
- Communicate and coordinate with nursing staff
- US ordered in computer
- US service called?
- Pt transported to US
- US performed, “sonomarked”
- Pt transported back to floor
- Post Procedure CXR
- Med resident contacts supervisor
- NO: Resident signed off?
  - YES: Proceed solo
  - US requested?
    - NO: Med resident contacts supervisor
    - YES: Proceed solo
Aim Statement

➢ To decrease the pneumothorax rate at UH and VAH, with the introduction of the Procedure Service/Patient Safety (PS²) Team by 10% by February 1st, 2012
Risk Factors for Pneumothorax

**Procedural**
- US vs no US
- Diagnostic vs Therapeutic
- Equipment
  - Catheter
    - Small Needle
    - Large needle
- # of needle passes
  - 1 pass
  - ≥2 passes
- Initial vs f/u thoracentesis
- Aspiration of air
  - Development of symptoms
    - chest pain
    - cough
    - shortness of breath

**Periprocedural**
- Operator skill
  - Novice
  - Experienced
- Patient Location
  - ICU
  - Non-ICU
  - Outpt
- Effusion size
  - Large
  - Small
- Sex
  - Male
  - Female
- Patient Ventilation
  - Mechanical
  - PS2 Team
  - Pulmonary
- Supervisor not available
- Operator skill
- PS2 Team
- Internal Medicine
- IR

**Factors increasing pneumothorax rate**

**Patients**
- Male
- Female
- Large effusion
- Small effusion
- Non-ICU
- ICU
- Outpt
- Mechanical ventilation

**Personnel**
- Novice
- Experienced
- Operator skill
- Supervisor not available
- Pulmonary
- Internal Medicine
- IR
- PS2 Team

**Equipment**
- Catheter
  - Small Needle
  - Large needle

**Procedural**
- US vs no US
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### What’s changed with PS²

<table>
<thead>
<tr>
<th>Before PS² introduced</th>
<th>After PS² introduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward team performs procedure</td>
<td>Procedure team performs procedures (available 8 am-4 pm weekdays)</td>
</tr>
<tr>
<td>Supervision by attending or ‘experienced’ resident</td>
<td>Supervised by Internal Medicine chief resident</td>
</tr>
<tr>
<td>Sonomarking performed by radiology, or procedure done without ultrasound</td>
<td>Bedside ultrasound by procedure team</td>
</tr>
</tbody>
</table>
**Pre-Admission – ER/Clinic**

Patient presents with sob, chest pain

Assessed by ED (incl. CXR, ordering, drawing, waiting for labs)

YES: Patient has Pleural effusion

Notify Triagist

Admit for tap?

NO PLEURAL EFFUSION: Exit algorithm

**Post-Admission – Medicine Service with PS^e**

Resident writes admit order

Bedflow finds bed for patient

Bedflow notifies triage staff of bed

Triage calls transport

Pt transported to the ward

Med resident assesses pt

Resident signed off?

Thoracentesis Indicated

YES: Proceed solo

Med resident contacts supervisor

NO: Med resident contacts supervisor

US requested?

US ordered in computer

US service called?

Pt transported to US

US performed, “sonomarked”

Pt transported back to floor

Supplies collected

Communicate and coordinate with nursing staff

Post Procedure CXR

Obtain working “COW”

Obtain consent

Order diagnostic studies

Do procedure

Label, bag specimens, place in box

Transport takes specimen to lab

Nurse calls transport
To assess impact of IM PS², we used Institute of Medicine’s six domains of quality:

- **Safe, Timely, Efficient, Effective, Equitable, & Patient-Centered [STEEP]**

Initial Step – Reviewed all Thoracentesis performed by Internal Medicine at VAH and UH from 1/1/11 to 6/30/11 to obtain baseline PTX rate

Next Step – Reviewed all Thoracentesis performed by the PS² and Internal Medicine at VAH and UH from 7/1/11-1/31/12 to obtain post-intervention PTX rate
Data Collection

- **Population of Interest**
  - Patients admitted to Internal Medicine service (IM) at the VAH or UH with a procedure code for thoracentesis
  - **Exclusions**
    - Infants
    - Trauma patients
    - No post procedure imaging

- **Data Sources**
  - Chart review (pre and post-intervention)
  - Procedure Team logs

- **Diagnosis of Pneumothorax**
  - Using post-procedure CXR/CT scan of chest
  - By faculty radiologist at VAH/UH

- **Time Period**
  - **Baseline**
  - **Post-implementation**
    - By PS² VA (7/2011-1/2012, n=36)
    - UH (7/2011-1/2012, n = 39)
    - By IM VA (7/2011-1/2012, n=24)
    - UH (7/2011-1/2012, n = 29)